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October 9, 2015

Kenneth Thiessen, Certified Engineering Geologist
Oregon Dept. of Environmental Quality - Northwest Region
700 NE Multnomah St., Suite #600
Portland, OR 97232

RE: Supplemental Source Control Evaluation (SSCE) Workplan
Former Bird Facility
6350 NW Front Avenue
Portland, OR 97230

Dear Mr. Thiessen:

As requested in your email correspondence dated October 6, 2015, Forensic Environmental Services, Inc. (FES), on behalf of the Former Bird Facility (Bird), provides this letter response to comments on the Supplemental Source Control Evaluation (SSCE) Workplan received: 1) in EPA correspondence dated September 21, 2015; 2) during a project team telephone meeting, including EPA and their contractors on Sept. 30, 2015; and 3) during a subsequent call with you on October 6, 2015. To simplify the response, EPA's written comments have been incorporated (in italics) below with the FES/Bird responses in red.

Following are the United States Environmental Protection Agency's (EPA) comments on the September 2015 document titled, Supplemental Source Control Evaluation Work Plan, Former Bird Facility, Portland, Oregon prepared by Forensic Environmental Services, Inc. (FES). The Former Bird Facility site is located at 6350 NW Front Ave, Portland, Oregon and listed in Oregon Department of Environmental Quality's (DEQ) cleanup program as ESCI #117. The site is located at approximately river mile 7.5 west (RM 7.5W)...

…EPA's review comments on the Work Plan are as follows.

General Comments

1. The site hydrogeology as described in Sections 1.3 and 1.4 of the Work Plan needs further explanation to support the proposed monitoring well installation and sampling. Of particular concern is the lack of explanation for the apparent large decrease in hydraulic head between monitoring wells MW-11 and MW-23, shown in the potentiometric contour maps of Figures 4 and 5. The large head differential between these two wells may indicate that the wells located in the former fill area (MW-18, MW-23, and MW-25) are completed in a different hydrogeologic unit or it may indicate that the groundwater levels in this area are strongly influenced by tidal changes in the Willamette River. Wells MW-18, MW-23, and MW-25 have screen intervals completed deeper in the aquifer and are screened across a coarse grained sand unit. Tidal effects on groundwater levels, seasonal changes in groundwater levels, and discussion of head differences in wells completed in the different hydrogeologic units at the site should be discussed in Sections 1.3 and 1.4. It is critical to understand the range of groundwater elevations in the former fill area and take this into account when installing new monitoring wells so that the well screens are completed at the appropriate depths (uppermost portion of the aquifer – see General Comment 2).

As discussed during the September 30, 2015 conference call, wells in the former fill area (i.e., MW-23) exhibit more variability in groundwater elevations (up to 10 feet) than wells in native materials (i.e., MW-11) where the seasonal groundwater elevation fluctuation is less than 5 feet. The current conceptual site model indicates the decrease in hydraulic head from MW-11 to MW-23 is likely a result of moving across the original riverbank from native materials into more transmissive fill deposits. Additionally, the more transmissive fill deposits likely experience a larger influence from river tidal fluctuations than wells west of the original riverbank (i.e., MW-11). This is further discussed under General Comments 2 & 5 below.

2. The rationale for the 30 – 40 feet depth screen intervals proposed for the former fill area wells MW-29 through MW-31 should be provided in the Work Plan. To characterize groundwater contamination in this area, these wells should have well screens completed in the uppermost part of the aquifer, taking into account seasonal and tidal high groundwater elevations. Based on the cross sections presented in the 2012 SCE Report (Figures 7-14 and 7-15), a 30 – 40 feet depth interval would put the top of the screen interval approximately 10 feet below the water table. Groundwater elevation monitoring data at existing wells and visual observations during drilling (e.g., soil color changes or oxidized zones) should be used to determine the seasonal high water table and well screen placement.

The intent of the Workplan is consistent with EPA's comment; i.e., to install the well screens in the uppermost part of the aquifer taking into account seasonal and tidal high groundwater elevations. The total depth of former fill area wells MW-18 & MW-25 is 35 feet and depth to water (DTW) at these two wells has varied from approximately 20 to 30 feet. The proposed wells are closer to the edge of the former fill area, so it was anticipated that total depths (and DTW) could be slightly deeper; therefore, the workplan proposed total boring depths (not screened intervals) of 30 to 40 feet. (cont.)

Response to General Comment 2 (cont.)

As recommended by EPA, groundwater elevation monitoring data at existing wells (including water level transducer data; see General Comment 5) and visual observations during drilling (e.g., soil color changes or oxidized zones), although not particularly useful during previous well installations in this area, will be used to determine the well screen placement. Based on the available information, it is anticipated a screened interval of approximately 20 to 35 feet will be utilized for the proposed fill area wells.

As noted during the Sept. 30, phone call, the proposed wells in the former fill area will be installed using a sonic drilling rig, which should: 1) provide continuous soil recovery; and 2) eliminate/reduce potential drilling refusal due to concrete rip-rap or other coarse fill materials that are likely present at the base of the former fill area.

3. EPA understands that groundwater discharge to both Saltzman Creek and the Willamette River are the primary pathways of concern for COIs detected at MW-22 at concentrations exceeding the Joint Source Control Screening Level Values (JSCS SLVs). However, the potentiometric surface maps in Figures 4 and 5 show the groundwater gradient at MW-22 towards the southeast, with contaminated groundwater potentially migrating towards Saltzman Creek and the offsite area. No monitoring wells are included south of Saltzman Creek to extend the potentiometric contours into the offsite area south of the creek. The Work Plan should address potential contaminant transport beyond Saltzman Creek to the offsite area to the southeast and provide rationale for why no monitoring wells are proposed to delineate groundwater contamination in this area.

Wells were not proposed in the leased area southeast of MW-22 because: 1) the available groundwater flow data and PAH signatures from MW-22 and upgradient wells on the Kinder Morgan Energy Partners (KMEP) property (e.g., MW-7) indicate KMEP is the source of the COIs detected at MW-22; 2) the leased area is owned by KMEP, which previously refused Bird access to install or sample wells on their property; and 3) KMEP has already installed some wells in this area (e.g., MW-39) and downgradient along the Willamette River (e.g., MW-34, MW-42B/C). Publically available data (and any additional data provided by DEQ for wells on the KMEP property) will be incorporated into future groundwater flow and isoconcentration maps to further evaluate potential contaminant transport in the referenced area.

The proposed wells (i.e., MW-26, MW-27 & MW-28) are intended to investigate: 1) if the COIs detected at MW-22 are impacting Saltzman Creek; 2) if fill materials on the Bird property between MW-22 and Saltzman Creek are a contributing source of COIs; and 3) if groundwater flow is converging on Saltzman Creek from the northeast and the southeast (i.e., the KMEP property).

4. The pore water investigation approach in the Work Plan relies on hydraulic head measurements and field water quality parameters at multiple sampling depths to determine the depth of the groundwater/surface water interface (GSI). Specific criteria should be identified in the Work Plan to determine what field water quality parameter values indicate groundwater, surface water, and mixed groundwater-surface water. These criteria will be important to differentiate upwelling mixed groundwater-surface water from upwelling groundwater. EPA is aware that a former salt pad area at the adjacent Arkema property resulted in groundwater having high conductivity in that area. This should be taken into account when evaluating conductivity values in groundwater and pore water near the northern property boundary.

As outlined in the Workplan and discussed during the Sept. 30 phone call, hydraulic head and water quality field parameters (i.e., pH, dissolved oxygen, conductivity, ORP, and temperature) will be measured at multiple sampling depths at each transect point. Based on other pore water studies (see Section 6.0 of the Workplan[1]), the variation in these parameters is site-specific; i.e., the specific parameters (and values) that will differentiate between groundwater, surface water, and mixed groundwater-surface water at the Former Bird site cannot be predetermined before the field investigation.

The potential for high conductivity groundwater originating at the Arkema site will be taken into account when evaluating groundwater and pore water near the northern property boundary. Elevated chloride levels are present in Former Bird wells adjacent to the Willamette River (see the DEQ comment below).

DEQ Comment: October 6, 2015: Chloride as a marker in pore water. Please provide a synopsis of chloride findings in Former Bird upland monitoring wells between the former Arkema salt pans and the pore water sampling area to determine if chloride is a reliable indicator of upland groundwater in the pore water sampling area.

Chloride was analyzed in groundwater samples collected at Former Bird during 2012 and the first half of 2013 (see attached table). A plot of the maximum detected chloride concentrations (see attached figure) indicates extremely high levels (over 2,400 parts per million) of chloride were present in MW-18, the well closest to the former Arkema salt ponds, with decreasing maximum (and average) chloride concentrations moving southeast to MW-25 (270 ppm) and MW-24 (111 ppm). Maximum chloride concentrations upgradient of this area, including other wells in the former fill area (i.e., MW-23 & MW-24), are all less than 50 ppm except MW-22 (69 ppm), which was previously discussed under General Comment 3.

[1] The following citation was omitted from the references listed in Section 10: Pitz, Charles F., 2009. High-Resolution Porewater Sampling Near the Groundwater/Surface Water Interface. Washington State Department of Ecology Publication No. 09-03-017, April 2009.

5. The effect of changing river stages throughout the tidal cycle on the position of the GSI should be evaluated in the Work Plan. Tidal effects have the potential to change hydraulic head and contaminant concentrations in groundwater near the GSI. Consideration should be given for collection of pore water samples during a similar time period in the tidal cycle.
A surveying rod (or similar) will be used to estimate river stage, which will be recorded during each pore water sampling event. Whenever practicable, pore water samples will be collected within a few hours of low tide.

As discussed during the Sept. 30, 2015 conference call, water level transducers will be placed in three existing monitoring wells at varying distances along a transect from the Willamette River (MW-11, MW-23 & MW-25) and in the Willamette River. The transducers will be activated for several days[2], and the data will help determine the well screen interval for the proposed wells in the former fill area (see General Comment 2).

6. The appropriate comparison criteria that should be used to evaluate surface water, groundwater, sediment, and soil are the Preliminary Remediation Goals (PRGs) that EPA has established for the Portland Harbor site. The latest version was released by EPA for stakeholder review in August 2015. The Sampling and Analysis Plan (SAP) Table 5-1 should be checked to verify that requested target detection levels are sufficient to meet the PRGs.
SSCE data will be compared to the criteria recommended by the EPA and the DEQ. The only analyte identified on the Portland Harbor PRG list that is not included on SAP Table 5-1 is TPH C_{10}-C_{12} aliphatics. Per direction of the DEQ, pore water study samples will also be analyzed for TPH C_{10}-C_{12} aliphatics. A modified version of Table 5-1, which lists SLV target detection levels (TDLs), was updated to highlight the limited number of analytes where the PRG TDL is lower than the SLV TDL and forwarded to the analytical laboratory.

Specific Comments
1. Section 1.5, page 4, paragraph 2 – It is not clear to EPA how the gauging data will be used to evaluate the interaction of stormwater, perched groundwater, and groundwater. Please expand on this so EPA understands how the interaction of stormwater, perched groundwater, and groundwater will be evaluated and whether the well installation under this work plan are sufficient for the evaluation.
As discussed during the Sept. 30 phone call, this was a general statement incorporated into Workplan; the current investigation is not designed to fully evaluate the interaction between stormwater, perched groundwater, and groundwater at the site. Gauging data from the proposed wells will be incorporated into the overall groundwater elevation database and utilized to the extent possible to further evaluate the interaction of water in the subsurface at the site.

[2] Note: if the transducer in the Willamette River cannot be adequately secured, it will be removed during non-working hours.

2. Section 2.0, page 5, paragraph 1 – The statement that six wells will be installed in the former fill area is not consistent with the proposed well locations in Figure 6 and the description in the sampling and analysis plan (SAP).
This was an error in the text - only three wells will be installed in the former fill area.

3. Section 3.0, page 8, paragraph 1 – EPA recommends that multiple groundwater elevation measurements be obtained from wells to evaluate the tidal effects on groundwater levels. An understanding of how groundwater elevations change throughout the tidal cycle is needed to evaluate the hydraulic gradient and how it changes over time.
As discussed under General Comment 5, the effects of the tidal cycle will be further evaluated by placing transducers in selected monitoring wells to record tidal levels during several days of the pore water sampling event.

4. Section 4.0, page 9, paragraph 2 - The Work Plan states that samples will be collected to a depth of 1 to 6 inches. However, the SAP (Section 2.2.3, paragraph 1) states a sample will be collected from 1 to 2 inches. EPA recommends a uniform depth be applied to the sampling plan and other planning documents.
The SAP will be modified to indicate all sediment samples will be collected from a depth of 1 to 6 inches.

5. Section 5.0, page 10, paragraph 1 – EPA understands that the 20 discrete bank soil sample locations will be determined in the field based on exposed soil; however, the general area from where the samples will be collected should be indicated on Figure 6. As part of the bank soil assessment, areas of bank armoring, vegetation, exposed soil, and erosional features should be documented on a map of the riverbank. The discrete riverbank soil sample locations should be shown on the map.
As discussed during the Sept. 30 conference call, the riverbanks are completely overgrown with dense blackberry bushes that prevent access (visual and physical) to the slope (also see the photos previously provided under separate cover). Therefore, it is not possible to map in advance the requested areas of bank armoring, vegetation, exposed soil, and erosional features. However, based on previous field reconnaissance, areas of exposed soil and erosion are extremely limited.

6. Section 5.0, page 10, paragraph 1 - It is stated that a "possible statistical analysis regarding the previously detected metal SLV exceedances" will be performed. However, there is no criteria given that would be used to determine if a statistical analysis on the metal would or would not be performed. If there is a metric for whether a statistical analysis would or would not be performed on metal SLV exceedances, it should be clearly articulated.
The potential utility of completing a statistical analysis will be evaluated after the sampling data are available. Any statistical analysis subsequently used to evaluate the data will comply with EPA and DEQ guidelines. Additional details and documentation will be provided in the relevant report.

7. Section 5.0, page 10, paragraph 3 - The Work Plan states that rip-rap and vegetation limit accessibility to the upper bank of Saltzman Creek and the Willamette River bank and that the middle and bottom of the embankment are the most likely source areas of sediment contribution, and therefore the sampling will be biased to middle and lower portions. However, if there are areas of bare sediment in the upper area, these could very well contribute sediment to the river/creek. EPA recommends that all reasonable attempts be made to collect upper bank soils where there is exposed, un-vegetated soil.
Based on previous field reconnaissance, areas of exposed, un-vegetated soil on the upper bank are extremely limited. All areas (upper, middle, and lower bank) of exposed, un-vegetated soil that can reasonably be accessed will be sampled.

8. Section 6.0, page 12, paragraph 5 – The method for collecting comparison surface water sample and surface water elevation at the transect point locations in the mudflat above the edge of water should be described.
The surface elevation of the transect point will be compared to surface water elevation at the edge of the water using a sight level and a surveying rod (or similar). A vertical profile of field parameters, including hydraulic head, will be completed at each pore water transect point. If surface water is not present at selected transect points, it will not be possible to compare surface water and groundwater in these areas.

9. Section 6.0, page 13, paragraph 1 – The GSI may vary in depth along the riverbank and may not be the same as determined at the transect locations. EPA recommends that hydraulic head be measured at each non-transect pore water sample location in addition to field water quality parameters. The hydraulic head of the pore water sample interval should be compared to the river stage to verify that the pore water sample interval is in an area of groundwater upwelling.
Hydraulic head will be measured and compared to river stage at all pore water sampling locations including non-transect points.

10. Figures 2 and 6 – A north arrow should be added to these figures.
Future versions of these figures will include a north arrow.

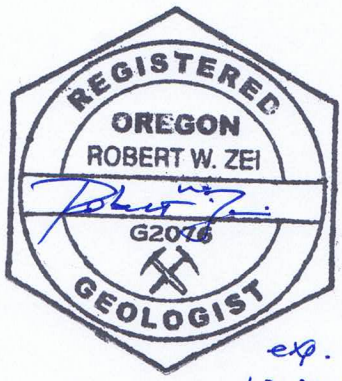
Assuming these responses demonstrate that a general agreement of work to be performed in the SSCE has been reached, FES is preparing to conduct the proposed SSCE pore water sampling, riverbank sediment sampling, and possibly, a Saltzman Creek water/sediment sampling event during the week of October 19, 2015. Based on current equipment availability, the proposed monitoring well installations have tentatively been scheduled for the week of December 7, 2015.

If you have any questions, please feel free to contact me at (610) 594-3940.

Sincerely yours,

FORENSIC ENVIRONMENTAL SERVICES, INC.

Robert W. Zei, Ph.D., RG #G2076
Sr. Project Manager



exp. 12-31-16

ec: Jan Allgood, CertainTeed Corporation
Lauren Alterman, Esq., Saint-Gobain Corporation

Table
Groundwater Sampling Results
Former Bird Site - Portland, Oregon

	MW-1	MW-11	MW-12	MW-14	MW-15	MW-16	MW-18
Feb-12	-	-	-	-	-	-	-
Mar-12	-	-	-	110000	-	-	27000
Jul-12	4400	11000	19000	93000	1700	29000	2400000
Oct-12	30000	31000	27000	-	10000	30000	37000
Jan-13	2100	9500	35000	57000	1800	22000	32000
Apr-13	4500/4700	15000	18000	110000	4700	24000	290000
maximum	30000	31000	35000	110000	10000	30000	2400000
average	10275	16625	24750	92500	4550	26250	557200

	MW-19	MW-21	MW-22	MW-23	MW-24	MW-25
Feb-12	1500	-	-	-	-	-
Mar-12	-	-	-	-	-	-
Jul-12	6900	2600	41000	9700	4400	270000
Oct-12	21000	2300	28000	22000	-	30000
Jan-13	5100	1900	31000	22000	9400	63000
Apr-13	3800	2100	69000	12000	3500	82000
maximum	21000	2600	69000	22000	9400	270000
average	7660	2225	42250	16425	5767	111250

Chloride concentrations via EPA Method 9056 in micrograms per liter (µg/L).

Maximum Chloride Concentration in Groundwater (2012-2013)

MW-17
MW-18
2400
MW-13
270
MW-16
30
MW-25
110
MW-14
22
MW-23
MW-19
21
MW-24
9.4
MW-15
10
MW-11
31
MW-12
35
30
MW-1
2.6
MW-21
MW-22
69

Legend

- 30 — Chloride Concentration (parts per million)
- Active Well Location
- Inactive Monitoring Well
- == Underground Culvert
- Property Boundary
- Leased Area Boundary

Forensic Environmental Services, Inc.	Fig:
FORMER BIRD FACILITY PORTLAND, OREGON	
0 35 70 140 Feet	Drawn By: SNS Date: 10/08/2015 Approved By: